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# Trophic levels

## Main article: [Trophic level](https://en.wikipedia.org/wiki/Trophic_level" \o "Trophic level)

A hot pyramid (a) and a food-web (b) illustrating [enviromentalrelationships](https://en.wikipedia.org/wiki/Ecological_relationship" \o "Ecological relationship)among creatures that are usual of a polar [boreal](https://en.wikipedia.org/wiki/Boreal_ecosystem) terrestrial ecosystem. The trophic pyramid roughly represents the biomass (usually measured as total dry-weight) at each level. Plants generally have the greatest biomass. Names of trophic categories are shown to the right of the pyramid. Some ecosystems, such as many wetlands, do not organize as a strict pyramid, because aquatic plants are not as productive as long-lived terrestrial plants such as trees. Ecological trophic pyramids are typically one of three kinds: 1) pyramid of numbers, 2) pyramid of biomass, or 3) pyramid of energy.

A trophic level (from Greek *troph*, τροφή, trophē, meaning "food" or "feeding") is "a group of organisms acquiring a considerable majority of its energy from the adjacent level nearer the abiotic source." Links in food webs primarily connect feeding relations or [trophism](https://en.wikipedia.org/wiki/Trophism" \o "Trophism) among species. Biodiversity within ecosystems can be organized into trophic pyramids, in which the vertical dimension represents feeding relations that become further removed from the base of the food chain up toward top predators, and the horizontal dimension represents the [abundance](https://en.wikipedia.org/wiki/Relative_species_abundance) or biomass at each level.When the relative abundance or biomass of each species is sorted into its respective trophic level, they naturally sort into a 'pyramid of numbers'.

Species are broadly categorized as [autotrophs](https://en.wikipedia.org/wiki/Autotrophs" \o "Autotrophs) (or [primary producers](https://en.wikipedia.org/wiki/Primary_producers)), [heterotrophs](https://en.wikipedia.org/wiki/Heterotrophs" \o "Heterotrophs) (or [consumers](https://en.wikipedia.org/wiki/Consumer)), and [Detritivores](https://en.wikipedia.org/wiki/Detritivore" \o "Detritivore) (or [decomposers](https://en.wikipedia.org/wiki/Decomposers)). Autotrophs are organisms that produce their own food (production is greater than respiration) by photosynthesis or [chemosynthesis](https://en.wikipedia.org/wiki/Chemosynthesis). Heterotrophs are organisms that must feed on others for nourishment and energy (respiration exceeds production).Heterotrophs can be further sub-divided into different functional groups, including [primary consumers](https://en.wikipedia.org/wiki/Primary_consumers) (strict herbivores), [secondary consumers](https://en.wikipedia.org/wiki/Trophic_dynamics) ([carnivorous](https://en.wikipedia.org/wiki/Carnivorous" \o "Carnivorous)predators that feed exclusively on herbivores), and tertiary consumers (predators that feed on a mix of herbivores and predators).[[83]](https://en.wikipedia.org/wiki/Ecology#cite_note-David03-83)Omnivores do not fit neatly into a functional category because they eat both plant and animal tissues. It has been suggested that omnivores have a greater functional influence as predators, because compared to herbivores, they are relatively inefficient at grazing.

Trophic levels are part of the [holistic](https://en.wikipedia.org/wiki/Holistic) or [complex systems](https://en.wikipedia.org/wiki/Complex_systems) view of ecosystems. Each trophic level contains unrelated species that are grouped together because they share common ecological functions, giving a macroscopic view of the system. While the notion of trophic levels provides insight into energy flow and top-down control within food webs, it is troubled by the prevalence of omnivory in real ecosystems. This has led some ecologists to "reiterate that the notion that species clearly aggregate into discrete, homogeneous trophic levels is fiction. Nonetheless, recent studies have shown that real trophic levels do exist, but "above the herbivore trophic level, food webs are better characterized as a tangled web of omnivores

# Biodiversity

## *Main article:*[*Biodiversity*](https://en.wikipedia.org/wiki/Biodiversity)

Biodiversity refers to the variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and [evolutionary](https://en.wikipedia.org/wiki/Evolution) processes that keep them functioning, yet ever changing and adapting.

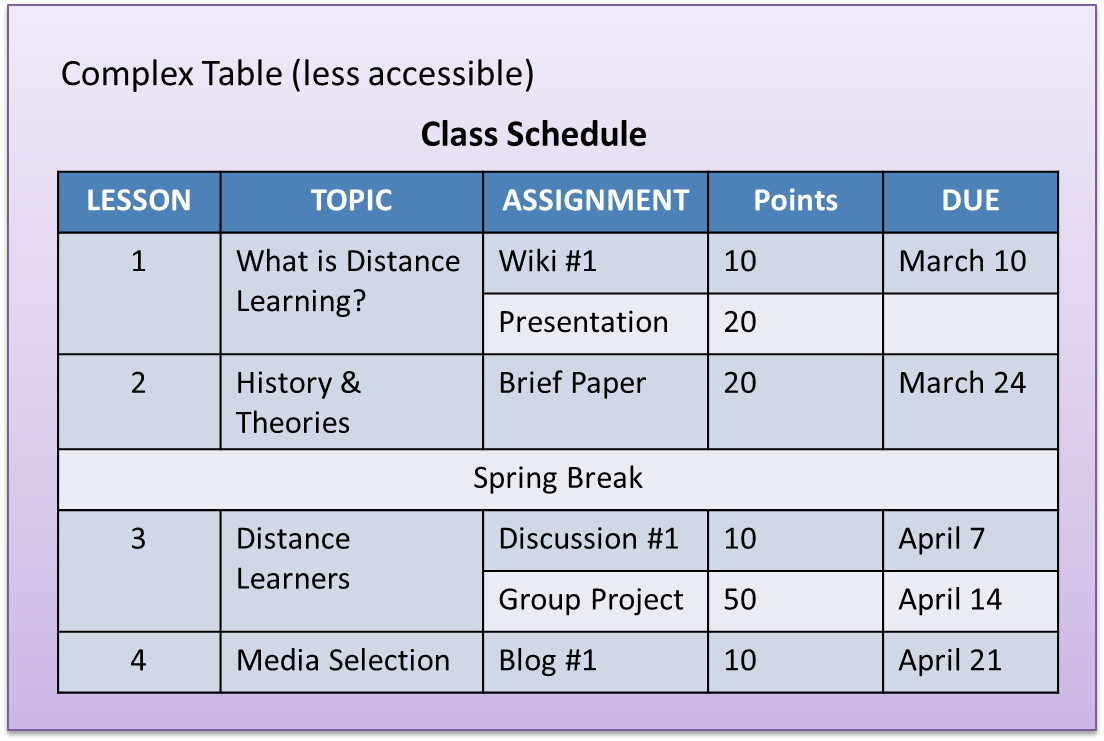
Biodiversity (an abbreviation of "biological diversity") describes the diversity of life from genes to ecosystems and spans every level of biological organization. The term has several interpretations, and there are many ways to index, measure, characterize, and represent its complex organization. Biodiversity includes [species diversity](https://en.wikipedia.org/wiki/Species_diversity), [ecosystem diversity](https://en.wikipedia.org/wiki/Ecosystem_diversity), and [genetic diversity](https://en.wikipedia.org/wiki/Genetic_diversity) and scientists are interested in the way that this diversity affects the complex ecological processes operating at and among these respective levels.Biodiversity plays an important role in [ecosystem services](https://en.wikipedia.org/wiki/Ecosystem_service) which by definition maintain and improve human quality of life. Conservation priorities and management techniques require different approaches and considerations to address the full ecological scope of biodiversity. [Natural capital](https://en.wikipedia.org/wiki/Natural_capital) that supports populations is critical for maintaining [ecosystem services](https://en.wikipedia.org/wiki/Ecosystem_services)and species [migration](https://en.wikipedia.org/wiki/Animal_migration) (e.g., riverine fish runs and avian insect control) has been implicated as one mechanism by which those service losses are experienced. An understanding of biodiversity has practical applications for species and ecosystem-level conservation planners as they make management recommendations to consulting firms, governments, and industry.

Niche

Main article: Ecological niche

Definitions of the niche date back to 1917, but [G. Evelyn Hutchinson](https://en.wikipedia.org/wiki/G._Evelyn_Hutchinson) made conceptual advances in 1957by introducing a widely adopted definition: "the set of biotic and abiotic conditions in which a species is able to persist and maintain stable population sizes." The ecological niche is a central concept in the ecology of organisms and is sub-divided into the fundamental and the realized niche. The fundamental niche is the set of environmental conditions under which a species is able to persist. The realized niche is the set of environmental plus ecological conditions under which a species persists. The Hutchinsonian niche is defined more technically as "[Euclidean](https://en.wikipedia.org/wiki/Euclidean_space) [hyperspace](https://en.wikipedia.org/wiki/N-dimensional_space) whose dimensions are defined as environmental variables and whose size is a function of the number of values that the environmental values may assume for which an organism has positive fitness."

[Biogeographical](https://en.wikipedia.org/wiki/Biogeography) patterns and [range](https://en.wikipedia.org/wiki/Range_(biology)) distributions are explained or predicted through knowledge of a species' [traits](https://en.wikipedia.org/wiki/Trait_(biology)) and niche requirements. Species have functional traits that are uniquely adapted to the ecological niche. A trait is a measurable property, [phenotype](https://en.wikipedia.org/wiki/Phenotype), or [characteristic](https://en.wikipedia.org/wiki/Phenotypic_trait) of an organism that may influence its survival. Genes play an important role in the interplay of development and environmental expression of traits. Resident species evolve traits that are fitted to the selection pressures of their local environment. This tends to afford them a competitive advantage and discourages similarly adapted species from having an overlapping geographic range. The [competitive exclusion principle](https://en.wikipedia.org/wiki/Competitive_exclusion_principle) states that two species cannot coexist indefinitely by living off the same limiting [resource](https://en.wikipedia.org/wiki/Resource_(biology)); one will always out-compete the other. When similarly adapted species overlap geographically, closer inspection reveals subtle ecological differences in their habitat or dietary requirements. Some models and empirical studies, however, suggest that disturbances can stabilize the co-evolution and shared niche occupancy of similar species inhabiting species-rich communities. The habitat plus the niche is called the [ecotope](https://en.wikipedia.org/wiki/Ecotope" \o "Ecotope), which is defined as the full range of environmental and biological variables affecting an entire species



# Biome

## Main article: [*Biome*](https://en.wikipedia.org/wiki/Biome)

Biomes are larger units of organization that categorize regions of the Earth's ecosystems, mainly according to the structure and composition of vegetation. There are different methods to define the continental boundaries of biomes dominated by different functional types of vegetative communities that are limited in distribution by climate, precipitation, weather and other environmental variables. Biomes include [tropical rainforest](https://en.wikipedia.org/wiki/Tropical_rainforest), [temperate broadleaf and mixed forest](https://en.wikipedia.org/wiki/Temperate_broadleaf_and_mixed_forest), [temperate deciduous forest](https://en.wikipedia.org/wiki/Temperate_deciduous_forest), [taiga](https://en.wikipedia.org/wiki/Taiga), [tundra](https://en.wikipedia.org/wiki/Tundra), [hot desert](https://en.wikipedia.org/wiki/Hot_desert), and [polar desert](https://en.wikipedia.org/wiki/Polar_desert). Other researchers have recently categorized other biomes, such as the human and oceanic [microbiomes](https://en.wikipedia.org/wiki/Microbiome" \o "Microbiome). To a [microbe](https://en.wikipedia.org/wiki/Microorganism), the human body is a habitat and a landscape. Microbiomes were discovered largely through advances in [molecular genetics](https://en.wikipedia.org/wiki/Molecular_genetics), which have revealed a hidden richness of microbial diversity on the planet.

The oceanic microbiome plays a significant role in the ecological biogeochemistry of the planet's oceans.

# Individual ecology

Understanding traits of individual organisms helps explain patterns and processes at other levels of organization including populations, communities, and ecosystems. Several areas of ecology of evolution that focus on such traits are [life history theory](https://en.wikipedia.org/wiki/Life_history_theory), [ecophysiology](https://en.wikipedia.org/wiki/Ecophysiology" \o "Ecophysiology), [metabolic theory of ecology](https://en.wikipedia.org/wiki/Metabolic_theory_of_ecology), and [Ethology](https://en.wikipedia.org/wiki/Ethology" \o "Ethology). Examples of such traits include features of an organisms life cycle such as age to maturity, life span, or metabolic costs of reproduction. Other traits may be related to structure, such as the spines of a cactus or dorsal spines of a bluegill sunfish, or behaviors such as courtship displays or pair bonding. Other traits include emergent properties that are the result at least in part of interactions with the surrounding environment such as growth rate, resource uptake rate, winter, and deciduous vs. drought deciduous trees and shrubs.

One set of characteristics relate to body size and temperature. The [metabolic theory of ecology](https://en.wikipedia.org/wiki/Metabolic_theory_of_ecology) provides a predictive qualitative set of relationships between an organism’s body size and temperature and metabolic processes. In general, smaller, warmer organisms have higher metabolic rates and this results in a variety of predictions regarding individual somatic growth rates, reproduction and population growth rates, population size, and resource uptake rates.

The traits of organisms are subject to change through acclimation, development, and evolution. For this reason, individuals form a shared focus for ecology and for [evolutionary ecology](https://en.wikipedia.org/wiki/Evolutionary_ecology).

# Η οικογένειά μου